

ABSTRACT

Using lateral physical modulation, the optical properties of VCSELs can be stabilized and controlled by spatially varying the characteristics of the device material. This results in stabilization of the linewidth, the numerical aperture, the near and far field, as a function of bias and temperature. A VCSEL includes a substrate, an active region sandwiched between an upper and lower distributed Bragg reflector (DBRs), and electrical contacts. A light emission property e.g. the index of refraction, may be varied by patterning or texturing the surface of the substrate prior to growth of the epitaxial DBR layers or at least one layer of either the upper or lower DBRs, or by inserting a non-planar layer.